

REMARKS

In response to the Office Action mailed March 25, 2009, Applicant respectfully requests reconsideration. To further the prosecution of this application, amendments have been made in the claims, and each of the rejections set forth in the Office Action has been carefully considered and is addressed below. The claims as presented are believed to be in condition for allowance.

Claims 2-4, 6-10, 12-14 and 16-20 were previously pending in this application. Claims 2, and 12 are amended. No claims are added or canceled. As a result, claim 2-4, 6-10, 12-14 and 16-20 remain pending for examination, with claims 2 and 12 being independent. No new matter has been added.

Claim Rejections Under 35 U.S.C. §103

Independent claim 2 stands rejected under 35 U.S.C. §103(a) as purportedly being obvious over U.S. Patent No. 5,614,687 to Yamada et al. (“Yamada”) in view of U.S. Patent No. 6,518,492 to Herberger et al (“Herberger”). Independent claim 12 stands rejected under 35 U.S.C. §103(a) as purportedly being obvious over Yamada in view of Herberger and further in view of U.S. Patent No. 6,140,565 to Yamauchi et al. (“Yamauchi”). As presented herein, each of claims 2 and 12 patentably distinguishes over any combination of the asserted references.

A. Brief Overview Of Embodiments Of The Invention

As Applicant’s specification discloses, conventional techniques for determining a tempo of sound involve: (1) acquiring audio data in a musical composition as time-series data, (2) calculating the auto-correlation of the audio data to detect peak positions in the audio data and acquire candidates for a tempo, and (3) analyzing the beat structure of the musical composition on the basis of the peak positions in the autocorrelation pattern and levels of the peaks to estimate the tempo of the musical composition (pp. 1-2). However, autocorrelation of audio data and analysis of beat structure involves numerous complicated computational operations (p. 2). As a result, many stereo systems (e.g., in-vehicle car stereo or home audio systems) are unsuitable for performing these

operations, as the load on the central processing unit (CPU) is too great (p. 2). Accordingly, some embodiments of the invention provide a technique whereby the tempo of an input sound signal, such as a musical composition, may be determined simply and accurately without performing the autocorrelation of audio data and beat structure analysis that places such a large processing load on the stereo's CPU (p. 3).

The foregoing overview is provided to assist the Examiner in appreciating some aspects of the invention. However, this overview may not apply to each independent claim, and the language of each independent claim may differ in material respects from the overview above. Therefore, Applicant respectfully requests that careful consideration be given to the language of each independent claim, and that each be addressed on its own merits, without relying on the overview above. In this respect, Applicant does not rely on the overview above to distinguish any of the claims over the prior art, but rather relies only upon the claim language and the arguments presented below.

B. Independent Claims 2 And 12

As amended herein, each of claims 2 and 12 includes limitations directed to detecting positions of peaks of change in level of an input sound signal, accumulating a frequency of occurrence of each time interval between the positions of peaks detected in a plurality of unit-time intervals, and identifying a tempo of sound to be reproduced with the sound signal on a basis of a maximum one among all the accumulated frequencies of time interval occurrence and not on a basis of any autocorrelation calculation or a beat structure analysis.

Each of claims 2 and 12 patentably distinguishes over any combination of the asserted references, as none of the asserted references discloses or suggests identifying a tempo of a sound to be reproduced with a sound signal in a manner which is not based on any autocorrelation calculation or beat structure analysis.

In the "Response To Arguments" section, the Office Action contends that Herberger satisfies the limitations of claims 2 and 12 directed to identifying a tempo of sound to be reproduced with a

sound signal on the basis of a maximum one among all accumulated frequencies of time interval occurrence. In particular, the Office Action points to a passage in which Herberger discloses that one way to perform beat structure analysis is to do an “envelope analysis” whereby beats are identified by detecting peaks in an envelope of approximately 20,000 or so re-sampled digital values representing about 50 seconds of a musical work (col. 6, lines 25-30).

The cited passage is part of an overall description by Herberger of a technique for automatically determining a tempo (i.e., beats per minute, or BPM) of a musical work (col. 5, lines 41-43). In particular, Herberger discloses that the “problem” of automatically detecting BPM may be divided into three sub-problems, the first of which is the identification of individual beats in the music (col. 5, lines 41-45). The second and third sub-problems involve determining a “characteristic time interval” between successive beats (i.e., determining BPM candidates for the musical work) and selecting from among the BPM candidates that which best represents the tempo of the work, respectively (col. 5, lines 46-51). The passage cited by the Office Action discloses in detail techniques for approaching the first sub-problem of identifying individual beats in the music via envelope analysis (col. 6, lines 22-25). Herberger discloses that envelope analysis may involve examining multiple aspects of a sound signal, such as identifying a “sharply inclined phase” often indicative of the initial part of a beat (i.e., the attack) or a change in the over all amplitude of the music, which Herberger discloses can be used to differentiate between a general increase in volume and a “true beat” (col. 6, lines 35-43). This is precisely the type of processing-intensive beat structure analysis which Applicant discloses many stereo systems (e.g., in-vehicle car stereo or home audio systems) are unsuitable for performing (Applicant’s specification, p.2).

In contrast to the techniques disclosed by Herberger, each of claims 2 and 12 includes limitations directed to identifying a tempo of sound to be reproduced with a sound signal in a manner which is not based on any autocorrelation calculation or beat structure analysis. As Herberger discloses a technique which includes performing beat structure analysis, each of claims 2 and 12 patentably distinguishes over any combination of the asserted references.

As such, Applicant respectfully requests withdrawal of the rejection of each of claims 2 and 12, and of the claims that depend respectively therefrom, under 35 U.S.C. §103(a) as purportedly being obvious.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, the Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 23/2825, under Docket No. S1459.70086US00.

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Respectfully submitted,

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